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Non-surgical endodontic management of iatrogenic root perforation with Biodentine: A case report

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Abstract

Iatrogenic perforations are artificially made communication occurs between tooth and periodontal supporting tissues which leads to endodontic treatment failure. Root canal treatment without proper knowledge, experience and clinical skills results in many complications such as missed canals, incomplete debridement and iatrogenic perforations. An iatrogenic perforation occurs about 2-12% of all root canal treated teeth. Successful management of this iatrogenic perforation depends upon early detection of perforations site, size of perforations, immediate repair of the perforations and materials used for sealing the perforations. Long term treatment success depends upon the proper knowledge about the treatment of iatrogenic perforation, host response and experience of the clinician. This case report describes the early detection of perforation site, proper disinfection of perforation and sealing with biocompatible material Biodentine successfully.

Keywords: Iatrogenic perforations, Nonsurgical treatment repair, Biodentine

Introduction

Glossary of endodontic terms by the American association of endodontists defined perforation as communication made either pathologically or mechanically between the root canal space and periodontal supporting tissues of teeth [1]. Every endodontic treatment has some undesirable complications, among those one of the eminent causes of the endodontic failure is perforation [2]. It can occur by two types 1. Iatrogenic and 2. Resorptive or caries extension. An iatrogenic perforation is a procedural error which can occur at any endodontic treatment steps. Kvinnsland *et al.* concluded that 53% of iatrogenic perforation happens during post space preparation and 47% occurred during routine root canal treatment [3]. An iatrogenic perforation during endodontic treatment occurs mainly due to lack of knowledge about internal anatomy, abnormal anatomic variations of teeth and lack of clinical experience of the operator. The perforations reduce the success of the root canal treatment about 54% to 56% and lead to extraction of teeth around 4.2%. [4] Classification of perforation given by Fuss and Trope includes 1. Furcal perforation 2. Lateral Perforation. Sub classification of lateral perforation includes: 1) Apical 2) Crestal 3) Coronal perforation [5]. Managing these iatrogenically induced perforations involves special care including early treatment to prevent bacterial contamination of the site and emergence of epithelial proliferation. This case report describes about the successful non surgical management of perforation in mandibular central incisor using good biocompatible material biodentine which results in long term success of endodontic treatment [6].

Case Report: A 17 year old male patient was referred to the department of Conservative dentistry and Endodontics by a general dental clinician as suspecting iatrogenic perforation in right mandibular central incisor for opinion and management. The patient medical history was non-contributory. On radiographic examination, the coronal radiolucency from pulp canal extending into distal side of the periodontal space just below CEJ was noted (Fig.1). The tooth was asymptomatic and non-tender to percussion at the time of reporting. On clinical examination under dental loupes, there was a large perforation observed on the distolingual aspect with profuse bleeding was noted. The treatment plan, prognosis and alternative treatment options were explained to patient and treatment procedure was carried out in single visit.

After administering Local Anaesthesia with 2% Lidocaine with 1:100000 epinephrine, the isolation were achieved with rubber dam. First the clear identification of perforation site (Fig.6) achieved with dental loupes [3.5 x magnifications, Zumax], the haemorrhage was completely controlled with adrenaline soaked in cotton pallet, then canal were negotiated with small 10 no k-file (Fig.2). After negotiating the canal path, the working length was confirmed with apex locator and confirmed with radiograph. The cleaning and shaping of the canal was done with protaper gold rotary files till F2 (Fig.3). Copies Irrigation was done 3% Naocl and 17% EDTA. The canals were obturated with F2 Gutta-percha using sealapex sealer. Then biodentine was mixed according to manufacturer's direction, which is then placed and sealed properly in the perforation site. The radiograph was taken to confirm the proper sealing of perforation site (Fig.4, 5, 7). Finally the cavity was restored with composite restoration.



Fig 1: Preoperative Radiograph

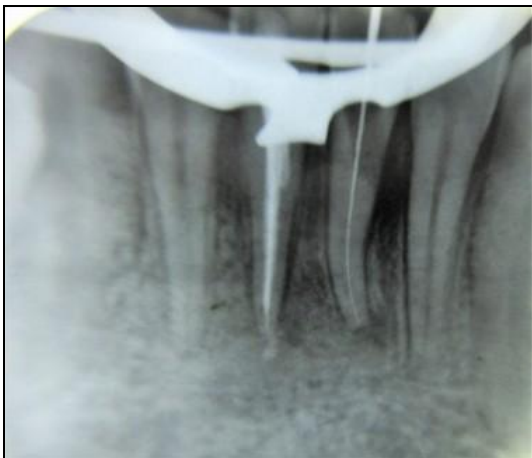


Fig 2: Working length Radiograph



Fig 3: Mastercone Radiograph

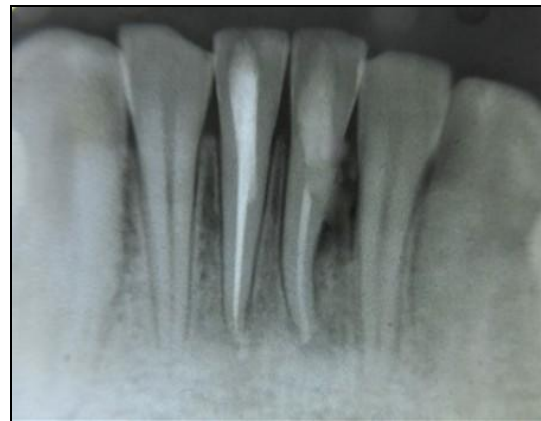


Fig 4: Postoperative Radiograph



Fig 5: Review after 3 months



Fig 6: Clinical image of Root Perforation

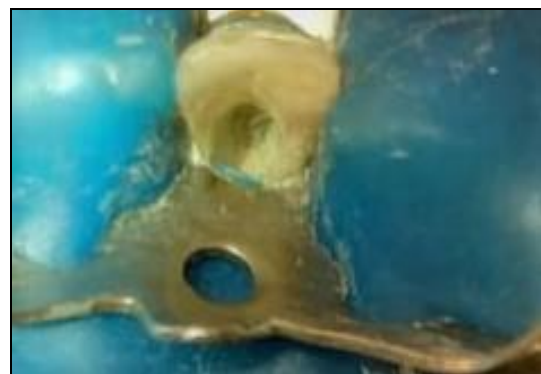


Fig 7: Clinical image of perforation Repair with Biodentine

Discussion

Iatrogenic perforations are an unlikely procedural error which affects the success of endodontic therapy. Common procedural mistakes lead to perforations includes overzealous

instrumentations, Post space preparation and improper knowledge about anatomy, lack of clinical skills and misuse of high speed rotary instruments. So proper treatment protocol and precautions need to be taken to avoid perforations [7]. First step includes proper preoperative evaluation with radiograph and CBCT to know about abnormal anatomy of canal [8]. Second step involves, endodontic instruments such as burs should be used with controlled speed and angulations. Files should be used in proper sequence with gentle pressure and technique. During post space preparation careful removal without removing too much dentin is necessary. Diagnosing this perforation includes radiograph with various angulations and CBCT. Profuse bleeding from canal, careful clinical visualizations using magnification devices such as Loupes, Microscope, sometimes assessing the tract with the gutta percha, small file, paper point and apex locator is required. Old perforation can be diagnosed by the presence of symptoms of chronic inflammation such as presence of pain, tender and serous exudates. Management of this iatrogenic perforation mainly depends on time elapsed between occurrence and treatment, material used and host response [9]. In this case fresh profuse bleeding without any symptoms reveals less time that perforation has occurred. So after proper detection of the perforation site and size, it is important to control bleeding, bacterial contamination and overgrowth of epithelium to the site. The outcome of treatment classified as fresh perforations have good prognosis when compared to old; apical and coronal perforation have favourable prognosis compared to crestal which involves more periodontal tissues comparatively [10, 11].

Final step involves about the material used for the perforation repair includes Zinc Oxide, GIC, Amalgam. Recently the ideal material used is MTA. The Superior properties of MTA such as biocompatibility, antibacterial, better sealing ability makes it most suitable material, however due to some drawbacks such as slow setting time and difficult handling properties, new biocompatible material called biodentine was introduced. Biodentine have setting time of 12 mins when compared to MTA having 2 hrs 45 mins and easy handling properties. Gunesser *et al.* proposed that biodentine exhibits better property than MTA when exposed to various irrigations [12, 13].

Conclusion

Thus, the procedural errors during endodontic treatment are difficult to avoid completely. It is necessary to acquire good knowledge about internal anatomy and the treatment protocol to manage abnormal anatomy and procedural errors in an effective manner by proper use of instruments and technology in dentistry. These measures can reduce the potential complications to both clinician and patient. This present case describes the successful management with biodentine in a non-invasive and conservative approach compared to MTA which will pave the way for long term success of endodontic treatment.

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